Glossary of biotechnology and genetic engineering

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FAO
RESEARCH
AND
TECHNOLOGY
PAPER
7

Food
and
Agriculture
Organization
of the
United
Nations

Rome, 1999

propagation (L. *propagare*, to propagate) The multiplication of plants by numerous types of vegetative material; an ancient practice dating from the dawn of agriculture, carried out in a nursery or directly in the field (vegetative propagation), and now in *in vitro* culture (micropropagation).

propagule Any structure capable of giving rise to a new plant by asexual or sexual reproduction, including bulbils, leafbuds, etc.

pro-phage The genome of a temperate bacteriophage integrated into the chromosome of a lysogenic bacterium and replicated along with the host chromosome.

prophase (Gr. *pro*, before + *phasis*, appearance) An early stage in nuclear division, characterized by the shortening and thickening of the chromosomes and their movement to the metaphase plate. It occurs between interphase and metaphase. During this phase, the centriole divides and the two daughter centrioles move apart. Each sister DNA strand from interphase replication becomes coiled, and the chromosome is longitudinally double except in the region of the centromere. Each partially separated chromosome is called a chromatid. The two chromatids of a chromosome are sister chromatids.

protamines Small basic proteins that replace the histones in the chromosomes of some sperm cells.

protease An enzyme that hydrolyzes proteins, cleaving the peptide bonds that link amino acids in protein molecules.

protein (Gr. *proteios*, of the first rank) A macromolecule composed of one to several polypeptides. Each polypeptide consists of a chain of amino acids linked together by covalent (peptide) bonds. They are naturally-occurring complex organic substances (egg albumen, meat) composed essentially of carbon, hydrogen, oxygen and nitrogen, plus sulphur or phosphorus, which are so associated as to form sub-microscopic chains, spirals or plates and to which are attached other atoms and groups of atoms in a variety of ways. The word was coined by Jöns J. Berzelius (1838) to emphasize the importance of this group of molecules. *See* polypeptide.

protein crystallization Making crystals of a protein, as a key part of most methods used for determining a protein's three-dimensional structure.

protein drug *See* therapeutic agent.

protein engineering Generating proteins with modified structures that confer properties such as higher catalytic specificity or thermal stability.

polygene One of many genes of small effect influencing the development of a quantitative trait; results in continuous variation and in quantitative inheritance. *See* gene.

polygenic Controlled by many genes of small effect.

polylinker A segment of DNA that contains a number of different restriction endonuclease sites. a.k.a. multiple cloning site (MCS).

polymer A compound composed of many identical smaller sub-units; resulting from the process of polymerization.

polymerase chain reaction (PCR) A procedure that amplifies a particular DNA sequence. It involves multiple cycles of ***denaturation, annealing*** to oligonucleotide primers, and ***extension*** (polynucleotide synthesis), using a thermostable DNA polymerase, deoxyribonucleotides, and primer sequences in multiple cycles of denaturation-renaturation-DNA synthesis. *See* polymerase.

polymerase An enzyme that catalyses the formation of polymeric molecules from monomers. A DNA polymerase synthesizes DNA from deoxynucleoside triphosphates using a complementary DNA strand and a primer. An RNA polymerase synthesizes RNA from monoribonucleoside triphosphates and a complementary DNA strand. *See* poly-(A) polymerase; polymerase chain reaction; RNA polymerase; *taq* polymerase.

polymerization Chemical union of two or more molecules of the same kind such as glucose or nucleotides to form a new compound (starch or nucleic acid) having the same elements in the same proportions but a higher molecular weight and different physical properties.

polymery The phenomenon whereby a number of genes at different loci (which may be polygenes) can act together to produce a single effect.

polymorphism The occurrence of two or more alleles at a locus in a population. a.k.a. genetic polymorphism.

polynucleotide A chain of nucleotides in which each nucleotide is linked by a single phospho-diester bond to the next nucleotide in the chain. They can be double- or single-stranded. The term is used to describe DNA or RNA. *See* nucleotide.

polypeptide A linear molecule composed of two or more amino acids linked by covalent (peptide) bonds. They are called dipeptides, tripeptides and so forth, according to the number of amino acids present.

polyploid (Gr. *polys*, many + *ploid*, fold) Tissue or cells with more than two complete sets of chromosomes, that results from